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For further information, please refer to the respective Achievement Test Bulletins, or call the Associate Director, Achievement Test and Diagnostic Evaluation Program, at 427-2948.

January 1988

Developing Achievement Tests

GRADES 3 • 6 • 9

Alberta
EDUCATION
Student Evaluation and Records Branch

The Student Evaluation and Records Branch develops achievement tests that measure student achievement at the grades 3, 6, and 9 levels. Province-wide testing in Language Arts, Mathematics, Science, and Social Studies follows a four-year cycle for each grade level. Many individuals and groups are involved in the development of each test: practising classroom teachers, school and central office administrators, and representatives of post-secondary institutions, Curriculum Design Branch, Language Services Branch, Regional offices, and the Student Evaluation and Records Branch. Student Evaluation and Records Branch staff ensure the development of valid and reliable tests.

Following is a summary of the phases of the test development process.

1. Planning

2. Approving Blueprints

3. Developing Test Questions

4. Constructing and Administering Field Tests

5. Analysing and Revising

6. Constructing Final Field Tests

7. Approving Final Field Tests

8. Administering Final Field Tests

9. Constructing the Final Test

10. Preparing and Administering the Test

11. Marking

12. Analysing and Reporting the Results

Under normal circumstances it takes three years to complete all phases in the process.

1. Planning

Test developers ensure that the design of each achievement test reflects the goals and objectives for achievement outlined in the Program of Studies and in the curriculum specifications for each subject. Planning takes into consideration those parts of the program that are testable in a paper and pencil format, and within a given time frame. Teachers and consultants from across the province assist in preparing the design of each test.

Test developers then prepare an interim test blueprint (an overall plan used to guide the development of a test). Questions that must be addressed at this point are:

- What knowledge and skills should students be expected to possess?
- What types of questions will constitute the test (multiple choice, short answer, or extended written response)?
- What weighting will each part of the test be given?
- How long and how demanding should the test be?
- How should the results of the test be organized for reporting purposes?

In order to ensure that each test will produce meaningful and reliable results, test developers incorporate statistical as well as curricular standards into the test design. Statistical standards include projected test means, range of question difficulty, and requirements for reporting. For example, the ideal mean of a multiple-choice test containing questions with four alternatives is 62.5%. This is the mid-point between chance selection (25%) and perfection (100%). The range of difficulty of multiple-choice questions is expected to vary from 30% to 85% to ensure that students with varying ability levels are challenged. Each dimension of the curriculum for which results are reported must contain at least six questions if the results are to be meaningful.

2. Approving Blueprints

Blueprint approval establishes the overall design of the test, the exact emphases given to each category for which results are reported, and the emphases given to the different cognitive levels.

The interim blueprint is reviewed by a committee of Alberta Education personnel that represents the Curriculum Design Branch (or Language Services Branch), Regional Office consultants, and the Student Evaluation and Records Branch. This committee reviews the interim blueprint and makes recommendations to the Director of the Student Evaluation and Records Branch.

The blueprint recommended by the Alberta Education committee is then reviewed by a Test Review Committee that consists of members nominated by the Alberta Teachers' Association, the Conference of Alberta School Superintendents, post-secondary institutions, and Alberta Education. This committee makes recommendations to the Director of the Student Evaluation and Records Branch.

3. Developing Test Questions

Following blueprint approval, committees of practising classroom teachers working at the appropriate grade level are formed, and question development meetings are held. These committees develop new test questions which reflect the goals and objectives of the Program of Studies and curriculum specifications. Where necessary, question developers are trained in the principles of question construction. Questions built in committee are then screened for format, validity, blueprint 'fit', and other design considerations.

4. Constructing And Administering Field Tests

After careful editing and formatting of questions developed by the teacher committees, field tests are constructed. Any required artwork is completed during this phase of the test development process.

With permission from school-jurisdiction personnel, field tests are sent to a number of teachers throughout Alberta. The students involved are representative of the student population for which the test has been designed. A minimum sample of 150 students writes each field test.

Teachers who administer a field test are asked to comment in writing on the following:

- reading level
- how closely the question matches the way in which a concept was taught
- level of difficulty of the questions
- quality of the questions and graphics
- errors of any kind

The results from the administration of this initial round of field testing are used to validate content, to determine difficulty levels, and to ensure that questions are expressed clearly and unambiguously.

5. Analysing and Revising

The results of each field test are then analysed and scrutinized to determine whether individual questions require revision. Teacher comments regarding the way that test questions are structured and the way that a subject is being taught are also carefully considered and used to guide revision.

Questions deemed to require changes are revised and submitted for further field testing.

6. Constructing Final Field Tests

Once the initial field test results are thoroughly analysed and questions requiring changes are revised, final field tests are constructed. These field tests follow the approved blueprint and parallel the actual achievement test in format and design.

Final field tests, like all field tests, are submitted for further validity checking, editing, and proofreading. In grades 6 and 9, separate tests in English and in French are developed for language arts. At this point, all other tests for Grade 6 and Grade 9 are translated into French.

7. Approving Final Field Tests

After the final field tests have been constructed, a second meeting of the Alberta Education Committee that represents the Curriculum Design Branch (or Language Services Branch), Regional Office consultants, and the Student Evaluation and Records Branch is convened. This committee reviews the final field tests and makes recommendations for improvement.

The Test Review Committee, which approved the blueprint in Phase Two of the test development process, meets a second time to review and recommend for approval the final field tests and the instructions for administering the tests. If a test includes short-answer or extended-writing questions, the Test Review Committee discusses

standards of achievement and marking standards appropriate for the test. Again, this committee makes recommendations to the Director of the Student Evaluation and Records Branch.

8. Administering Final Field Tests

The final field tests are administered and the results are used as a final screen in selecting questions for placement on the provincial achievement test. A minimum sample of 250 students writes each final field test. The sample is selected to include:

- only students who have received instruction in the subject
- students representing a normal distribution of ability levels
- students from rural and urban schools
- students from large and small schools

9. Constructing The Final Test

The construction of the final test form is based upon information collected from the final field test administration. The Test Review Committee is reconvened to review the final test form.

The test is submitted again for final validity checking, editing, and proofreading. Grade 6 and Grade 9 achievement tests, in subjects other than language arts, are translated into French at this time.

For each test an information bulletin is prepared, outlining the design and nature of the upcoming test. These bulletins are distributed to each school in September to facilitate program and instructional planning by teachers and administrators.

10. Preparing and Administering the Final Test

The completed achievement test is commercially printed and prepared for distribution. It is administered to the students by their classroom teachers.

Sufficient copies of the test are mailed to each school. Quantities are based on the number of students enrolled in the subject as reported to the Student Evaluation and Records Branch by school superintendents.

11. Marking

All written-response sections of the tests are marked by classroom teachers. These teachers, recommended by their superintendents, currently teach the subject being evaluated, have taught the subject for a minimum of two years, and hold a valid permanent Alberta Professional Teaching Certificate. Student Evaluation and Records Branch staff train and supervise the teachers during the marking sessions. All multiple-choice responses are machine scored.

12. Analysing and Reporting the Results

Once the test has been written, at least 20 classroom teachers review the test, question by question, to judge the appropriateness of the standard built in to the test. These teachers identify a test score that reflects student performance at an honors level and a test score that reflects student performance at a minimum acceptable level based on the requirements of the Program of Studies. The teacher assessments are then compared to the actual levels of student achievement on a provincial basis. These results are reviewed by the Test Review Committee which reconvenes a final time. This committee reviews the results of the test in terms of the objectives of the Program of Studies being measured.

Statistical reports are prepared and distributed to superintendents, school principals, Alberta Education officials, and other Departments of Education. These reports are also made available to the general public. In addition to the Provincial Report, each school and jurisdiction receives a statistical summary for its respective student population.